



2018 CLEAN WATER RESILIENCY PLAN

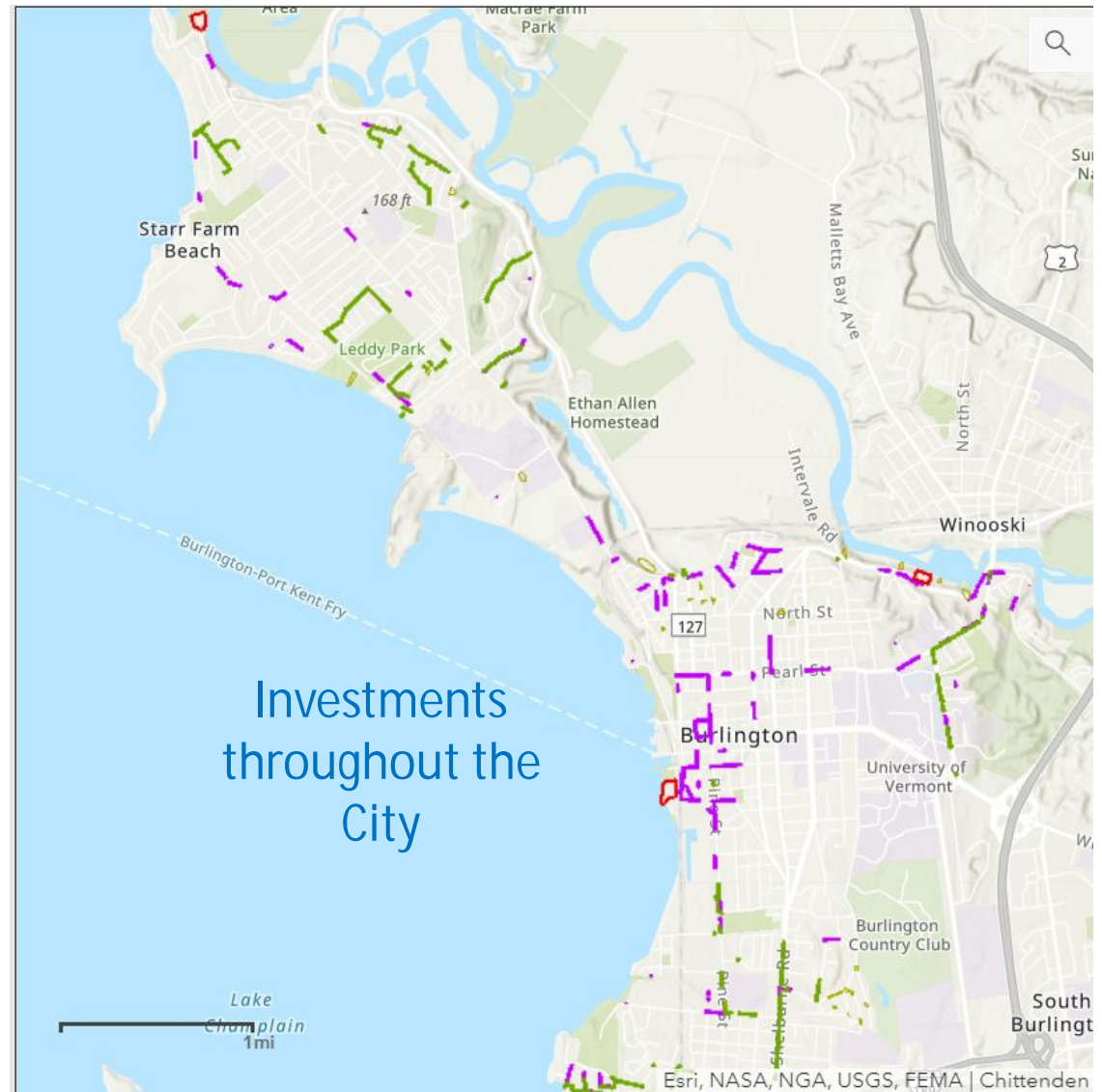


AGENDA

- Overview Bond Proposal
- Summer Infrastructure Issues
- BTV Water Quality Progress
- Detailed Bond Proposal: Infrastructure Stabilization & Modernization
- Rate Impact & Affordability Strategies
- Questions/Resources

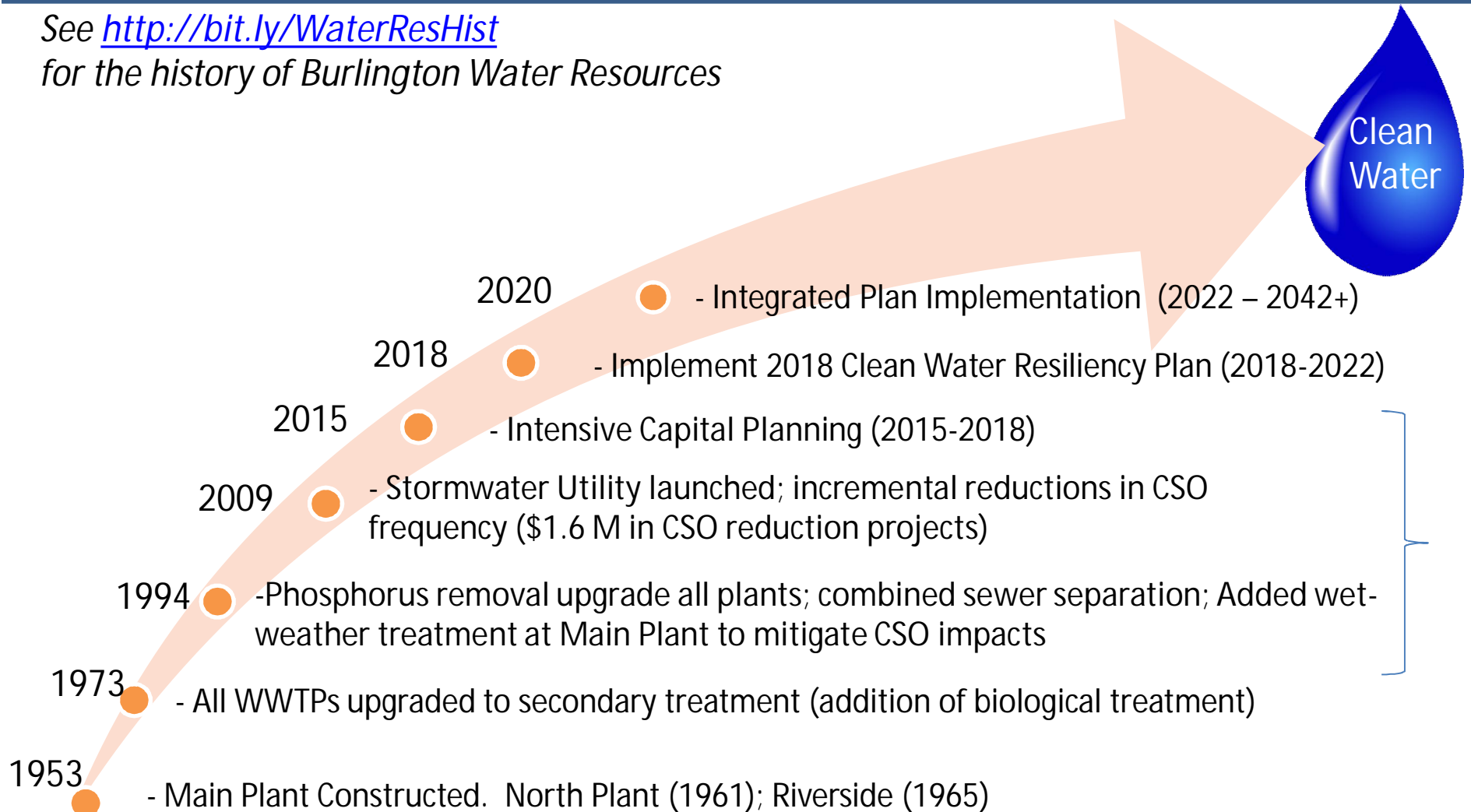
CITYWIDE REINVESTMENT & CONTINUED LAKE STEWARDSHIP

- Stabilize and modernize aging infrastructure
- Continuing a Citywide Legacy of natural resource protection
- The Clean Water Resiliency Plan is result of years of careful risk-based capital planning
- \$30 M Plan
 - \$19.9 M for Wastewater
 - \$10.1 M for Stormwater
- \$5.36/month increase for typical single family property owner
- Bond Vote November 6

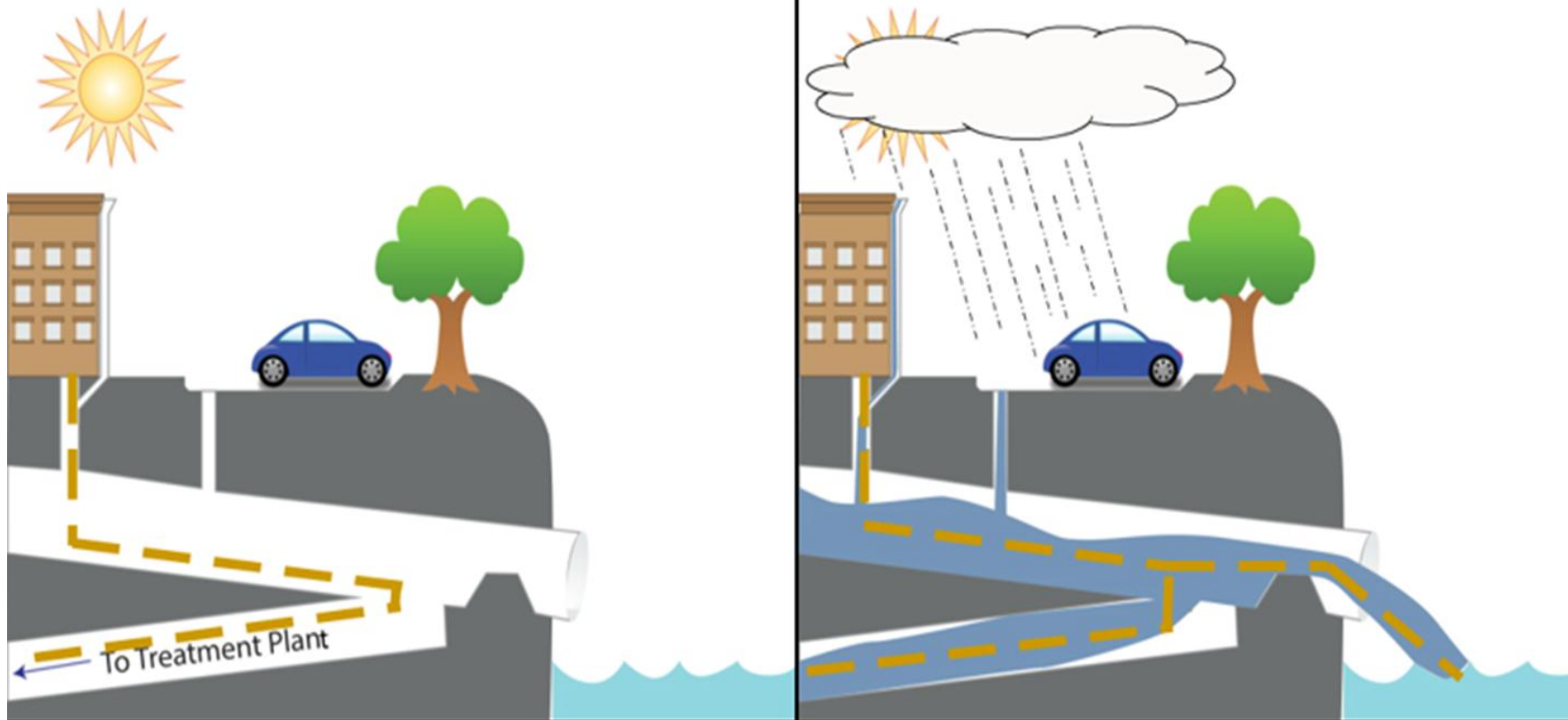


Clear Progress on Clean Water

See <http://bit.ly/WaterResHist>
for the history of Burlington Water Resources



An Inherited Challenge: Our Combined Sewers



Under normal conditions, wastewater goes directly to the wastewater treatment plant

When a large rain event occurs, stormwater joins wastewater and excess flows get discharged into nearby streams

This prevents sewage backups into properties and onto roadways/sidewalks

Before 1994: Large Volumes of Combined Sewer Overflow Discharged Annually into Lake Champlain

Prior to 1994 more than 170 Million Gallons of an untreated mixture of stormwater and sewage discharged annually into Lake Champlain, Englesby Brook, Winooski River



Up until early 1990s – 11+ CSO

Gazo Ave

Manhattan @ Park St

Manhattan @ N Champlain St

Colchester Ave (not ID'ed until 2010)

Pine St @ Lakeside (not ID'ed until 2015)

Bottom of Maple St

Bottom of College St

Howard St

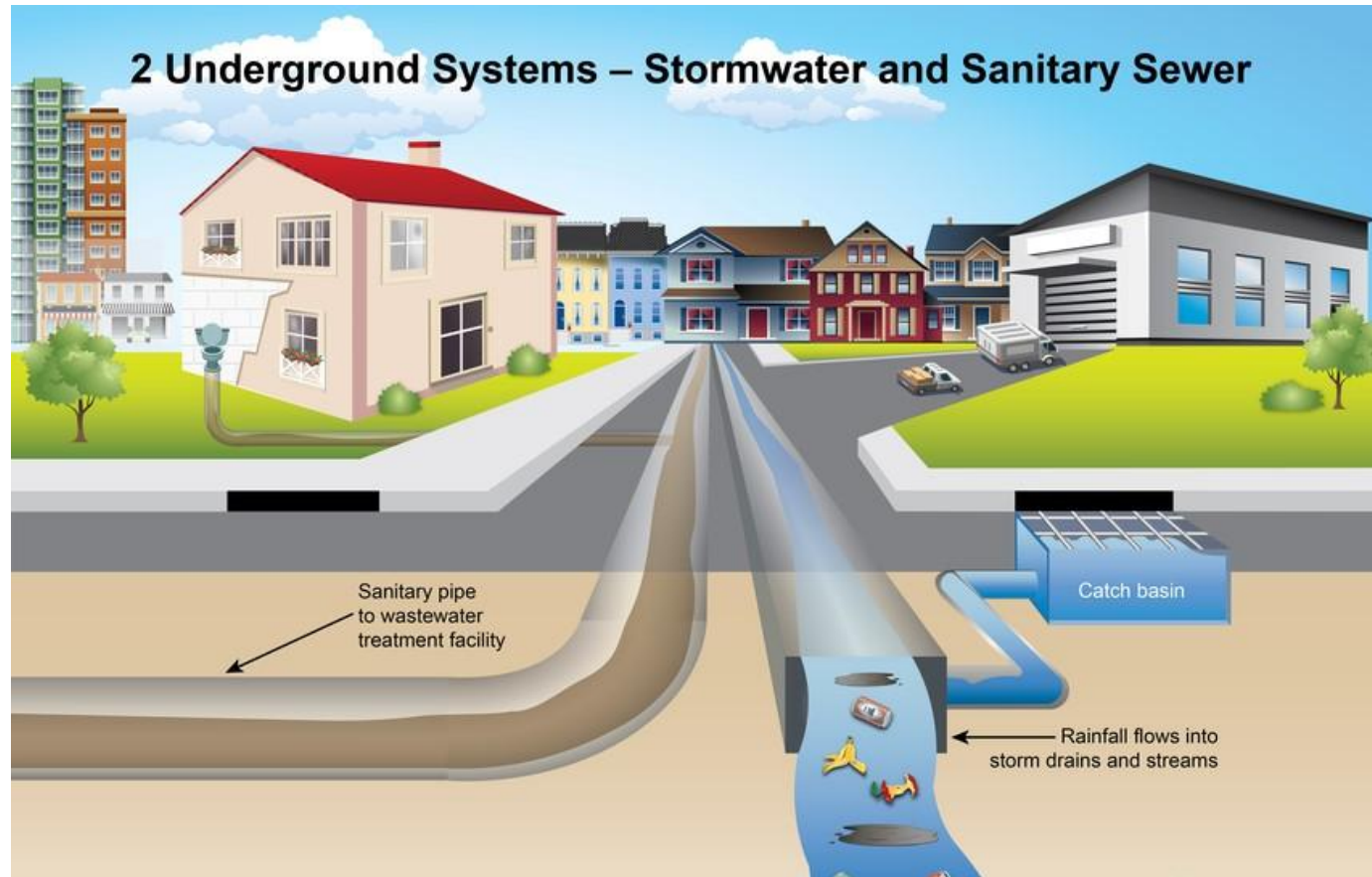
Marble Ave

Englesby Brook (multiple points)

Main WWTP (shoreline discharge with no treatment or disinfection)

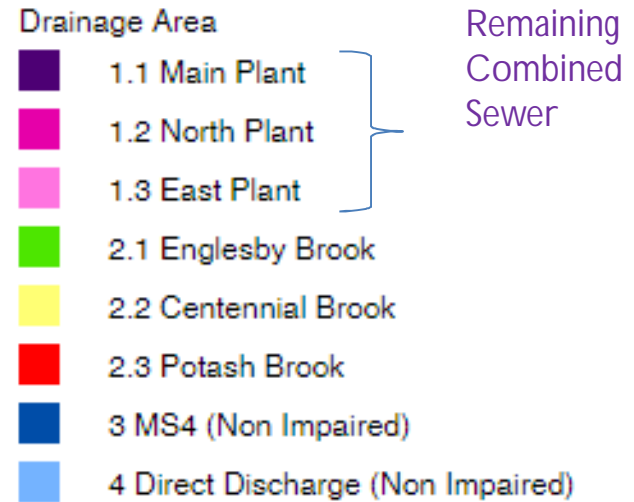
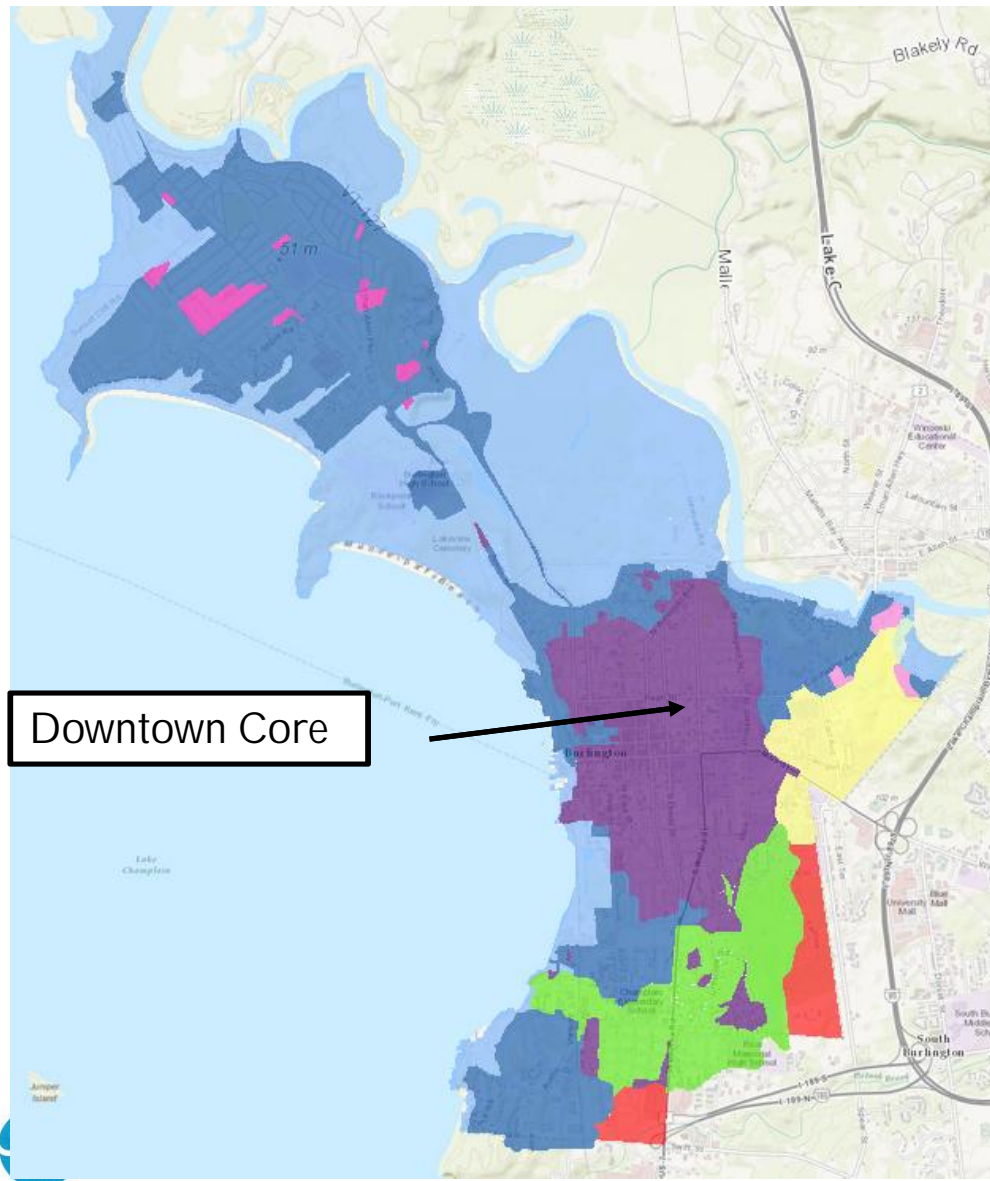
1994 \$52M Improvements: Collection System – CSO Elimination

Through sewer separation (unfortunately without treatment)



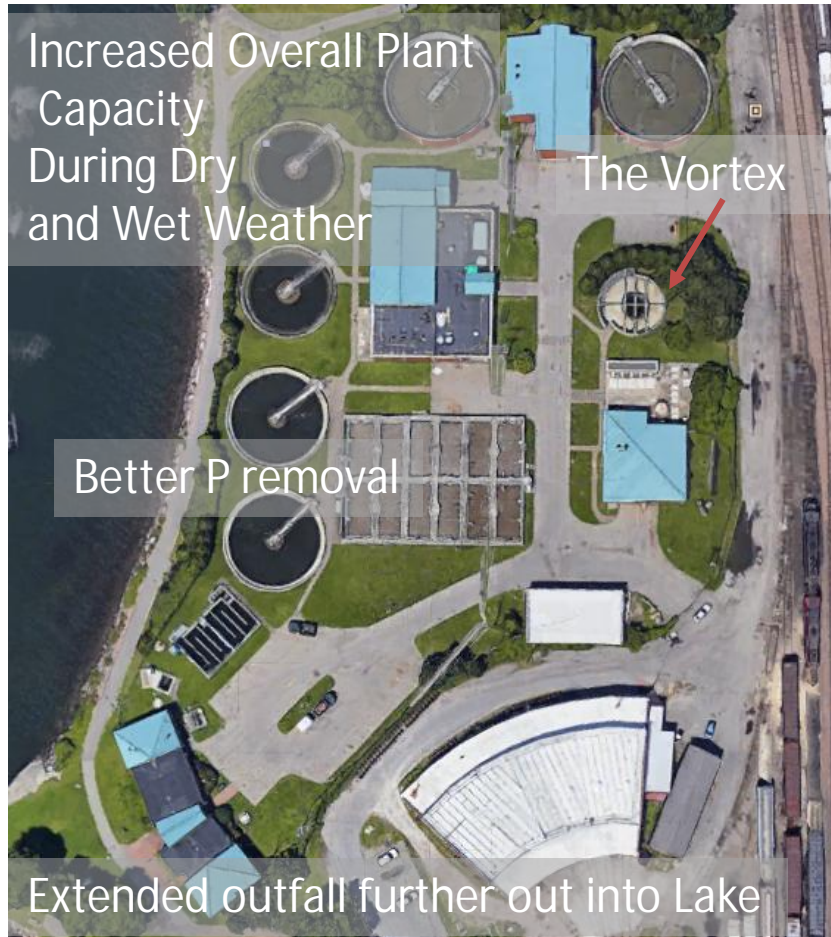
Unfortunately we now know that untreated stormwater runoff can have long term chronic impacts such as nutrient loading and bacteria pollution.

Complete Separation Not Deemed Feasible/Cost Effective, Particularly in the Downtown Core and Because Of Likely Long-Term Water Quality Impacts



- 26% of sewered land area is served by a combined sewer
- Main WWTP Plant Combined Sewer Area has very high % imperviousness (~57%)

1994 \$52 M Bond: Phosphorus Removal and CSO Treatment



- Installed a CSO screening and disinfection system à “The Vortex”
 - treats combined sewer flow that reaches the plant but exceeds the capacity of the overall plant
 - Screens solids and sends them to the plant for treatment
 - Uses quick acting disinfection agent to bring discharges well within Vermont WQ Standards.

Remaining (CSOs) Combined Sewer Overflow Locations

Today – 5 Locations

Gazo Ave

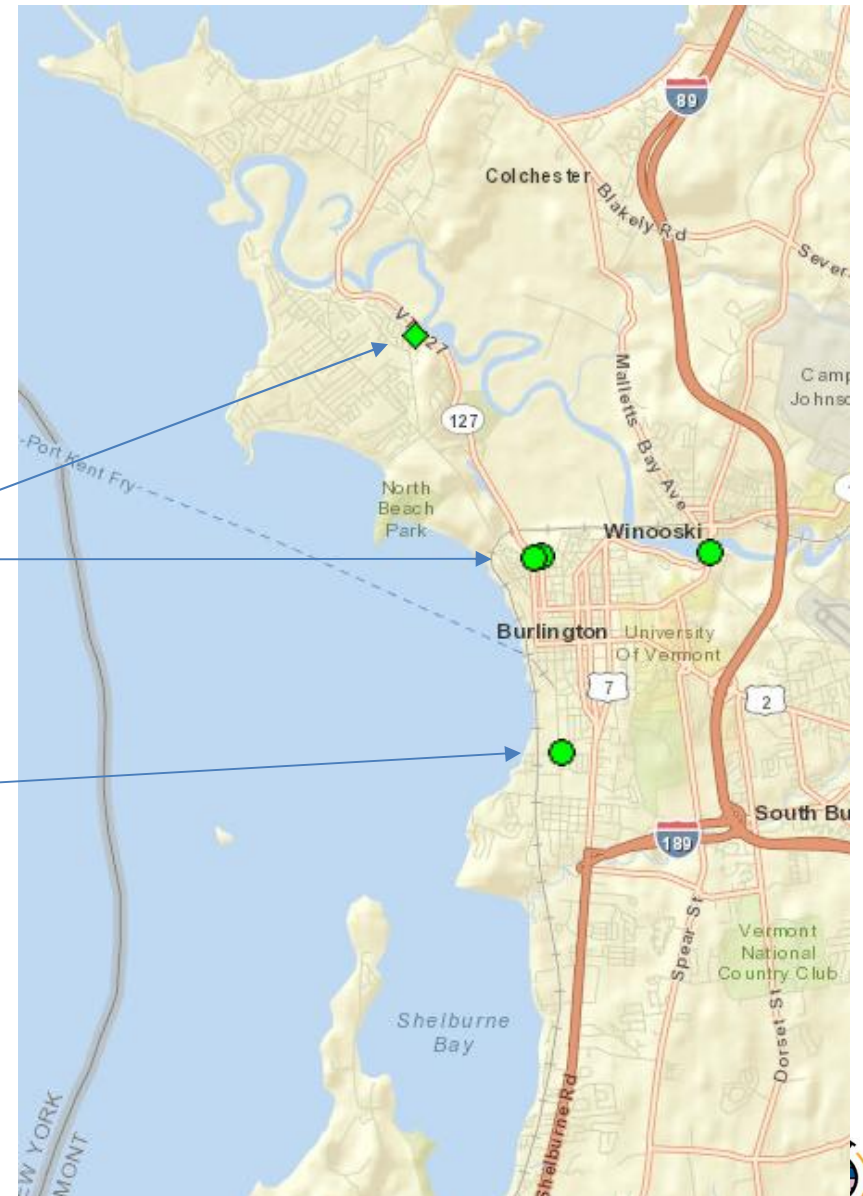
Manhattan @ Park St

Manhattan @ N Champlain St

Colchester Ave (not ID'ed until 2010)

Pine St @ Lakeside (not ID'ed until 2015)

- Before 2009, “Manhattans” and Gazo were frequent and high volume CSOs
- Today: Pine Barge Canal CSO is most active and responsible for most of untreated CSO volume
- Discharges into southern end of Pine Barge Canal Superfund site, travels 2100' before discharging to Lake Champlain



Since 2009: Improved Stormwater & Wet Weather Management

- Launched Stormwater utility in 2009 – 2nd in state
 - Address new stormwater regulations and long term precipitation driven water quality issues
 - Continue work on CSOs
- Increased regulatory review of development projects (Chapter 26 of City Ordinance)
 - Required to manage at least 50% of existing impervious
 - Required to manage 100% of new impervious
 - Large projects required to take additional SW off Combined Sewer system to offset their projected WW flows (Cambrian Rise, City Place Burlington, etc.)

Recent Wet Weather Mitigation Projects



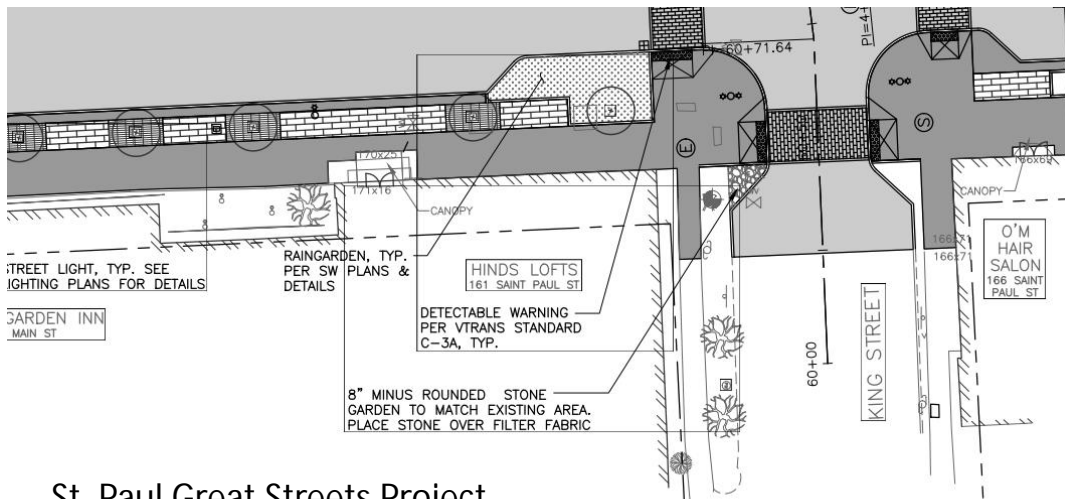
Grant Street Infiltration System



King Street Infiltration System



Upper North Infiltration Bumpouts



St. Paul Great Streets Project

Additional Implementation:

- Hyde Street Bioretention
- S. Winooski SW Sidewalk
- Park Street Infiltration System
- Russell Street Infiltration System
- *North Ave Infiltration System*
- *Allen Street Infiltration System*
- *Booth Street Bumpouts*
- *Possible Separate SW Outfall for Railyard Enterprise Project*

Collection System – Improving Untreated CSO Trends

Frequency of Untreated CSOs 2005 through 9/26/18

Year	N. Champlain	Park	Gazo	Colchester	Pine Street	Notes
2005	3	12	1	UNK	UNK	
2006	1	11	3	UNK	UNK	
2007	3	8	2	UNK	UNK	
2008	2	13	?	UNK	UNK	
2009	4	8-9	?	UNK	UNK	
2010	0	5	?	2	UNK	Colchester Ave CSO discovered through mapping/outfall visits
2011	1	9	1	3	UNK	Gazo, North Champlain and Park frequency and Volume reduced by ARRA projects 2010-2012
2012	1	6	1	9	UNK	
2013	4	6	2	10 - 13	UNK	Wet year
2014	0	1	1	2	UNK	Colchester CSO improved through pipe cleaning downstream
2015	0	3	1	0	8	Pine Street Discovered through mapping
2016	0	1	0	0	5	
2017	0	1	1	0	8	
2018 YTD	1	1	0	1	8	

Note: Frequency data do not show decreases in duration or volume, particularly for Park and Gazo; nor adjust for the impact of wet/intense rainfall years such as 2011 and 2013.

UNK = Previously unidentified CSO point, no data available

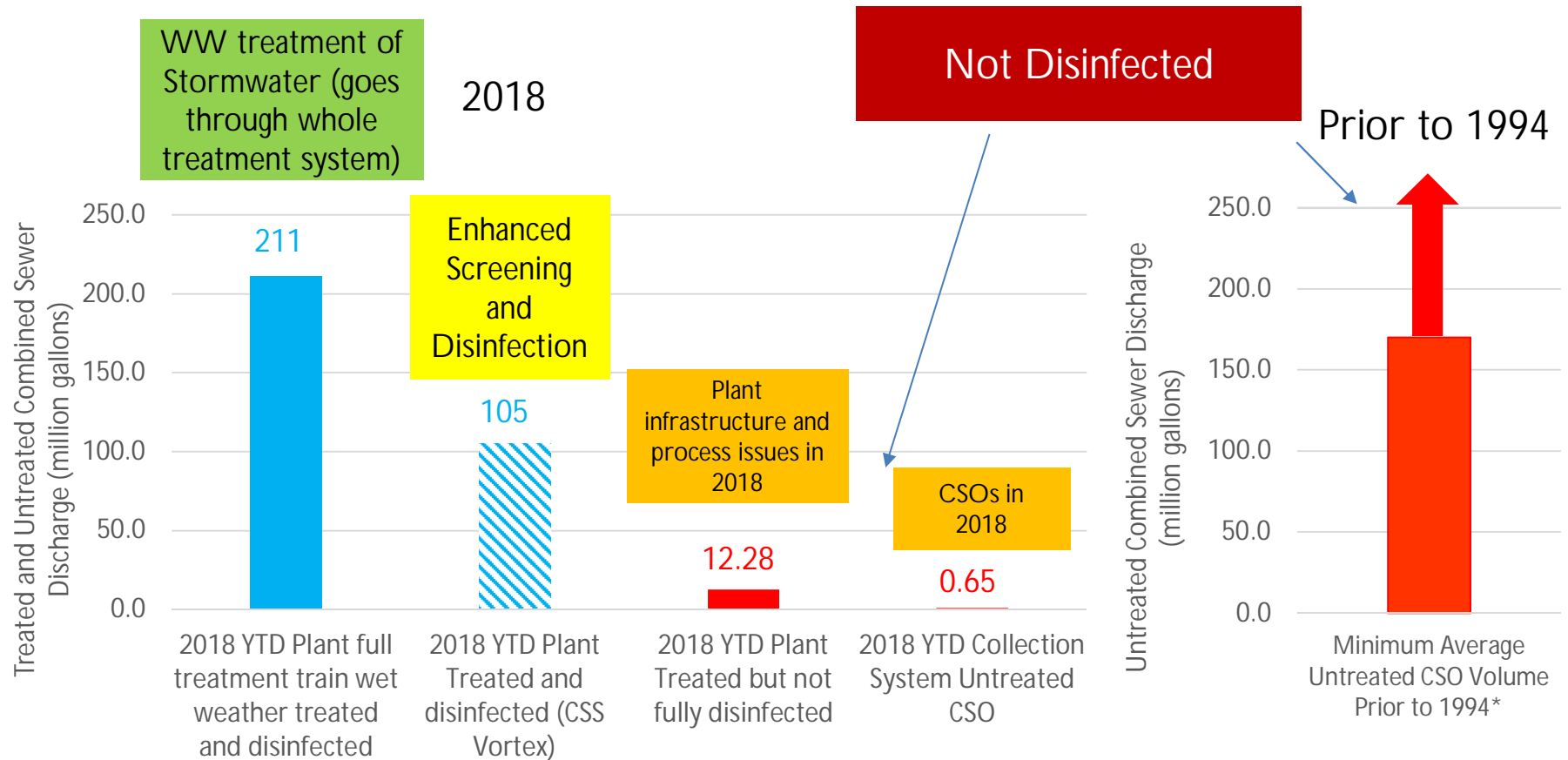
? = data not easily available, still researching

Range provided when unclear or multiple events on one day

Recent installations of flow meters at Pine, Park, Gazo are now providing volumetric data

Main Wastewater Plant

Comparison of Combined Sewer Discharges from Pre 1994 to 2018 (through 9/26/18)



- Wastewater and a large volume of stormwater receive premium treatment at the Main Facility
- Overall, the volume and frequency of untreated collection system combined sewer overflows is significantly decreased from the 1990s and has decreased further since 2009

Increased Capital Planning in Recent Years

Burlington Wastewater
20 Year Engineering Evaluation,
10 Year Capital Plan and
Consulting Engineering Report

Prepared For:

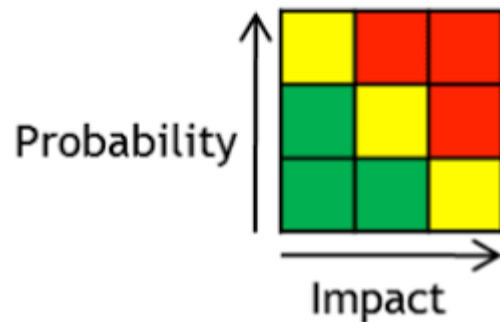
Burlington Department of Public Works
Burlington, Vermont 05401



City of Burlington March 10, 2017

DuBois
& King
INC.

FOCUS ON RISK BASED
CAPITAL PLANNING



S Wastewater 20 year engineering evaluation and 10 Year Capital Plan (2017)

S Stormwater Outfall Assessment (2014-2017)

S First Phase Sewer Pipe Assessment (2017-2018)

S Asset Management /Risk based decision making (since 2013)

S Integrated Planning (Longer Term Water quality improvements)

S Persistent water quality challenges

S Newer regulations (Lake Champlain Cleanup)

No comprehensive upgrades have been made to the Wastewater Plants since 1994.

Following are a number of examples of the impacts of underinvestment



Bromine pumps: 24 years old; critical to disinfection of wet weather



Corroded metal components: Full of bandaids and patches or not easily repairable.



11 Critical Pump Stations

(pump sewage from low lying areas of City to Plants)



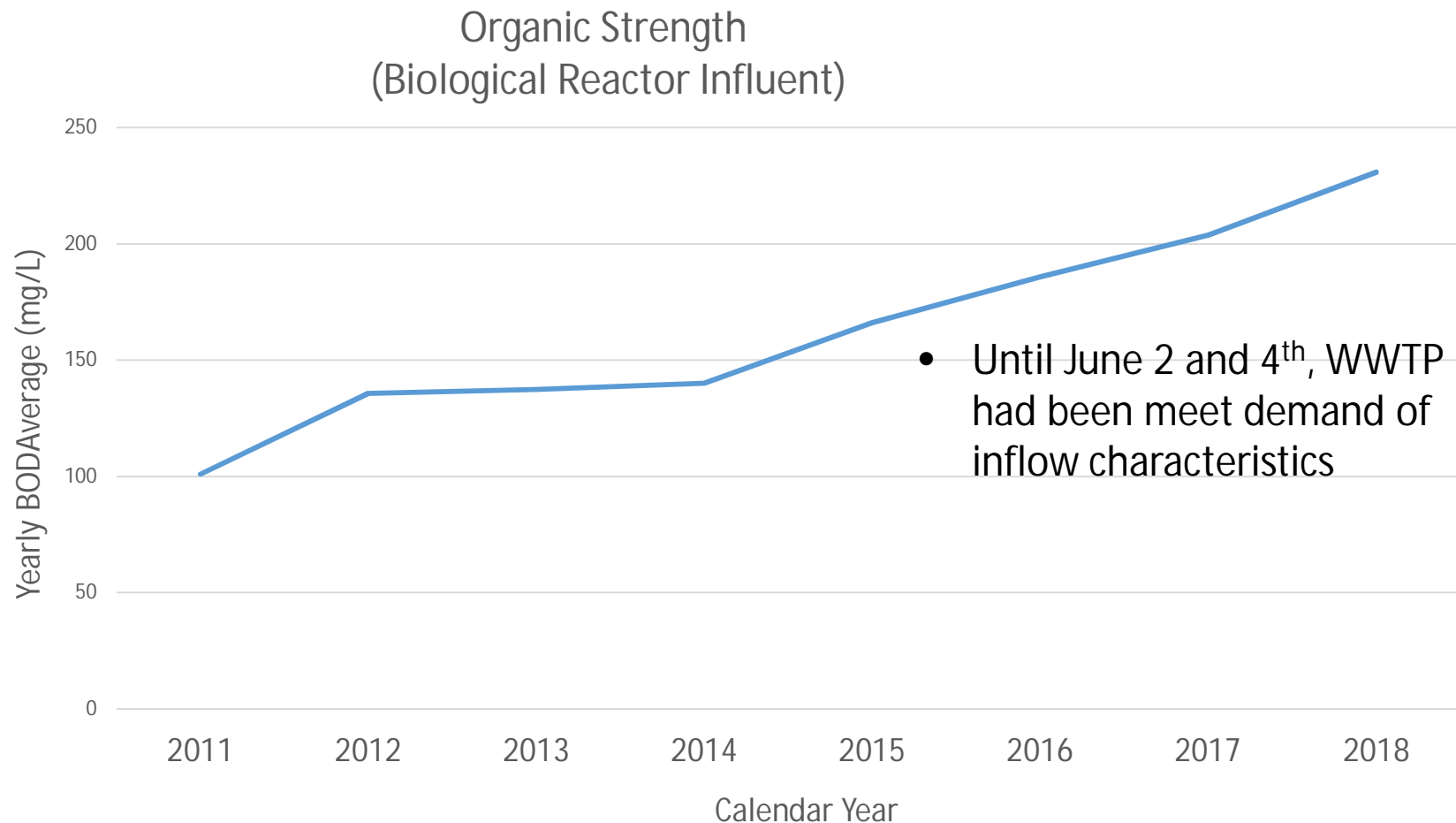
- 25 total stations
- 4 of 11 high priority pump stations were built in 1960s and have not had wholesale upgrades
- Several have original pumps, valves and piping
- Corroded metal
- Safety issues – control location require confined space entry
- Do not meet VT requirements for on-site storage (to prevent discharge of sewage to nearby waterbodies)



13 miles of Collection System Pipes & 5 Stormwater Outfalls



Tracking Trends Showing Increasing Strength of Wastewater

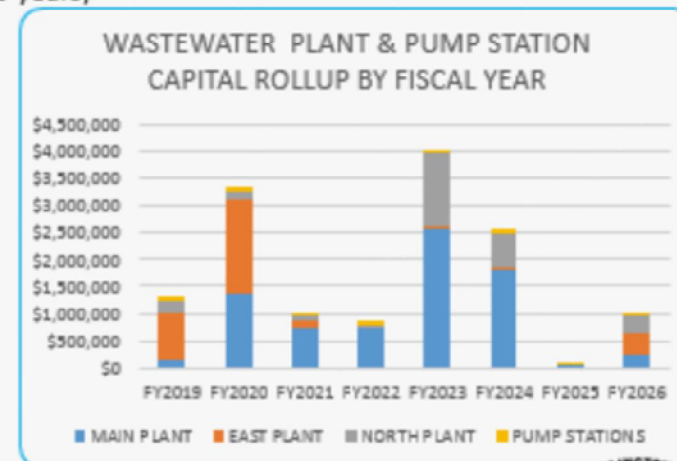


- Typical domestic WW = 250 mg/L
- All industries/businesses handling organics will have elevated BOD
- Brewery/Cidery WW ranges from 4000-15,000 mg/L

Known Need Was on Near Term Horizon

Looking ahead to FY 20 and beyond *Challenges*

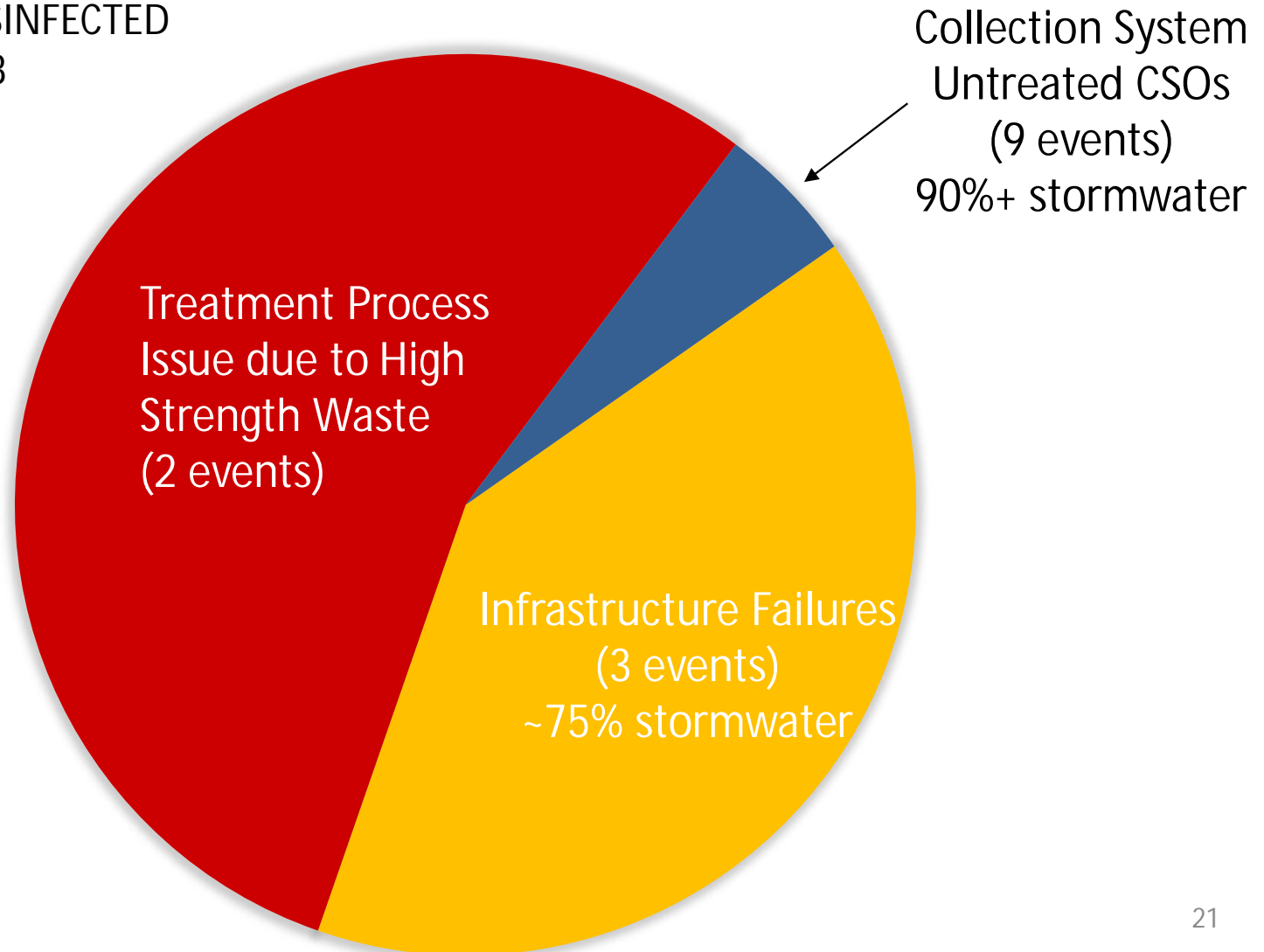
- **Water Debt**
 - Important to maintain or increase Moody's A1 rating
 - Maintain required 1.25 Debt Coverage Ratio
- **Future Water Resources Borrowing to meet Capital Deficits**
 - Water:
 - Water Bond authorization will only replace/rehabilitate ~8-10 miles of our 110 mile distribution system
 - High Service Tanks: At a minimum, Redstone Storage tank maintenance (~\$500k) due in FY2021 (likely sooner); UVM tank maintenance (\$1M) in FY27
 - Wastewater:
 - ★ Replacement of existing treatment system components at WWTPs and pump stations (\$8-10M)
 - ★ Collection System capital needs (~\$1M/year for 5 years)
 - Lake Champlain TMDL possible plant upgrades
 - Biosolids management
 - Stormwater
 - ★ Collection System capital needs (~\$1M/year for 5 years)
 - ★ Outfall Repair (\$3 M to fix top 11 worst outfalls)
 - Lake Champlain TMDL impervious retrofits
 - Combined Sewer Overflow Management
- **Revenue**
 - Conservation/Water efficiency
 - Lose rest of Hadley Road in FY2020 (\$110K)



ACTING NOW

2018 Permit Violations and Beach Closures

CAUSES OF UNDISINFECTED
DISCHARGES 2018
Total = 13 MG

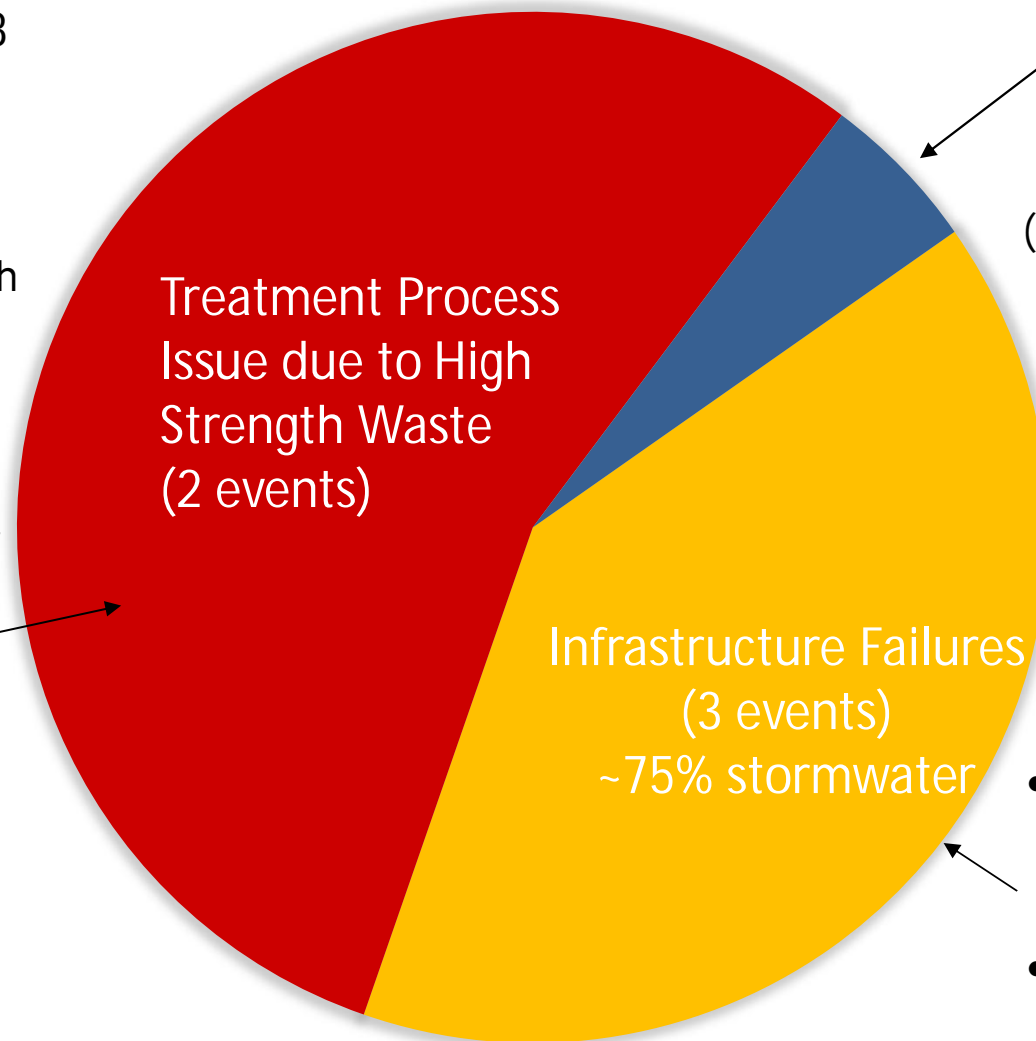


ACTING NOW

2018 Permit Violations and Beach Closures

CAUSES OF UNDISINFECTED
DISCHARGES 2018
Total = 13 MG

- Met with known high strength dischargers to accelerate pollution prevention
- Hired Industrial WW Consultant
- Implemented increased sampling

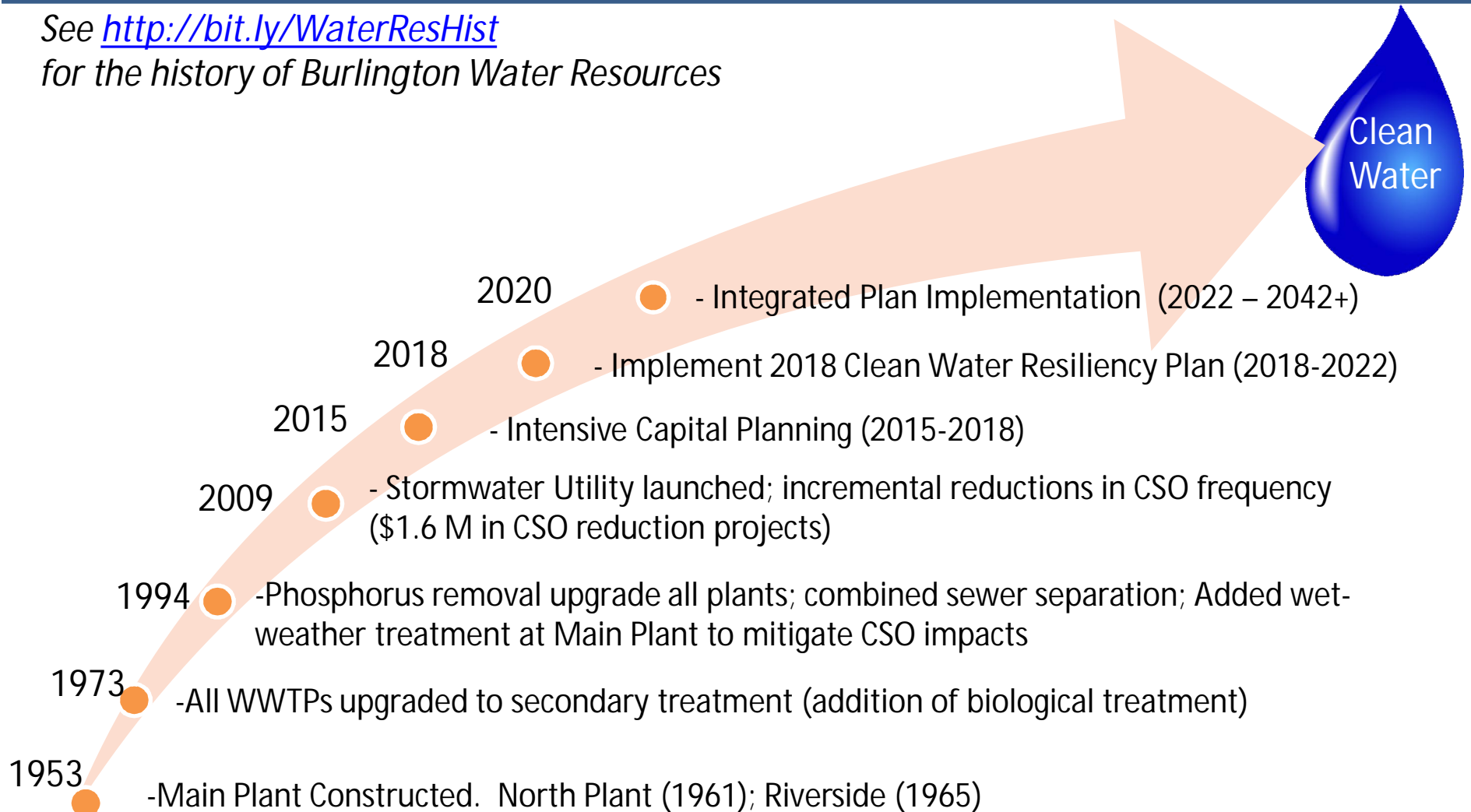


Collection System
Untreated CSOs
(9 events)
90%+ stormwater
(no notable change from
previous years)

- Short term fixes implemented immediately
- On-call staffing plan enhanced

Clear Progress on Clean Water

See <http://bit.ly/WaterResHist>
for the history of Burlington Water Resources

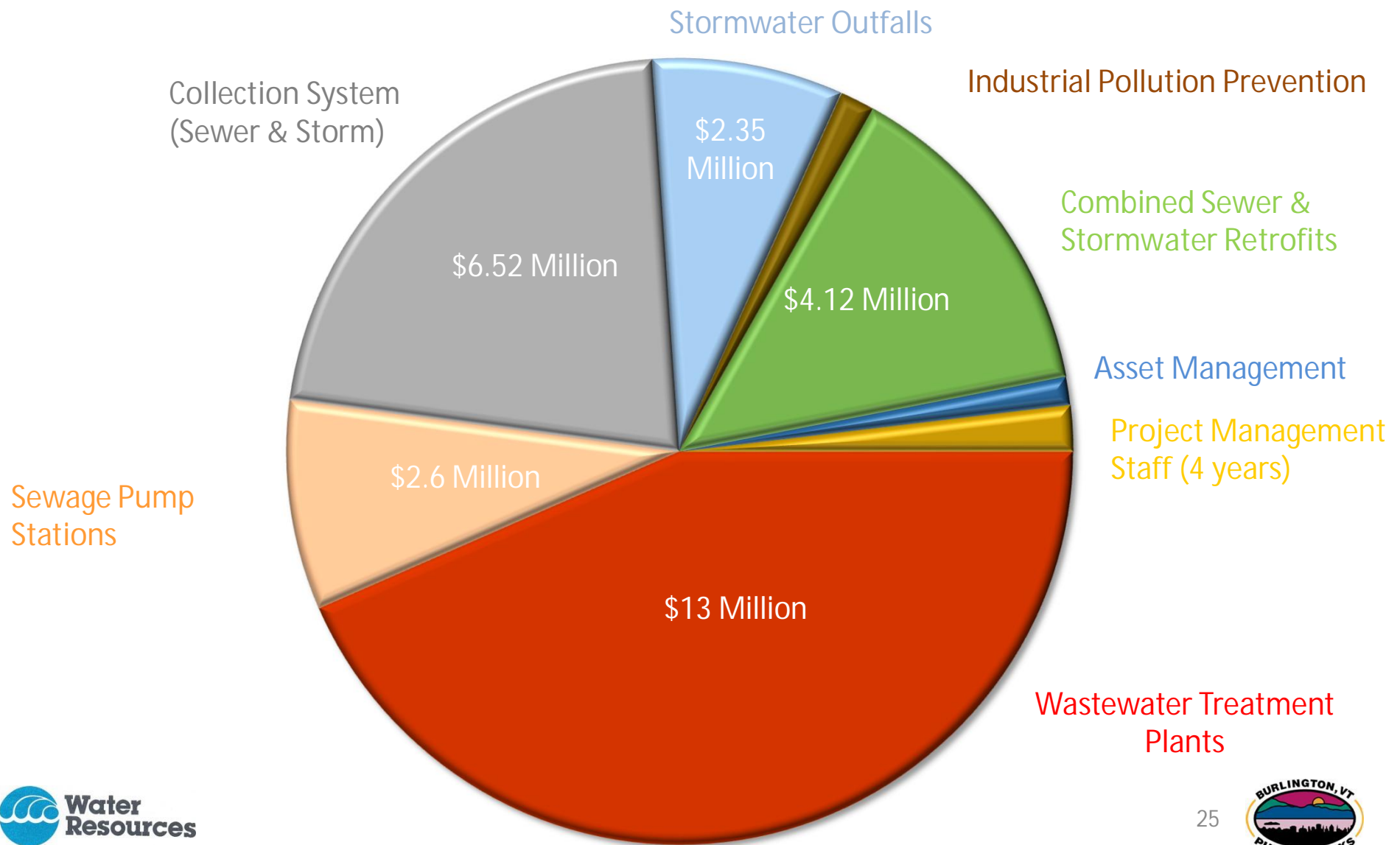


Clean Water Resiliency Plan and Bond 7 Points to Stabilize and Upgrade

1. Investing in Wastewater Treatment Plants
2. Updating Pump Stations
3. Relining and Rehabilitating Sewer and Stormwater Pipes
4. Repairing Stormwater Outfalls
5. Implementing Pollution Prevention Programs
6. Constructing Green Infrastructure and other Retrofits for Combined Sewer and Separate Stormwater Management
7. Completing Integrated Planning

\$30 M Clean Water Resiliency Bond

Portfolio of Investments over next 4 – 5 years



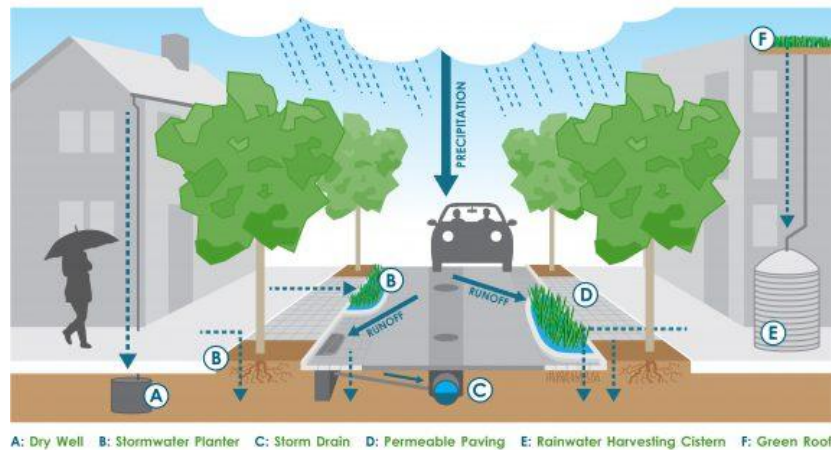
Clean Water Resiliency Investment Highlights

Stabilizing and Modernizing Existing Infrastructure

- Disinfection Systems (completion early – mid 2019)
 - Computerized Controls (SCADA and PLCs)
 - Mechanicals (pumps, valves, piping)
- High Risk wastewater infrastructure at all 3 plants
- 11 most high risk pump stations
- 13 miles of sewer, combined sewer, stormwater collection system

Improvements to Existing System

- Continue mitigation work on untreated collection system combined sewer overflows and combined sewer flows to Main Plant (10-12 impervious acres)



- Evaluate feasibility and cost benefit of satellite disinfection station at Pine Street Barge CSO
- Implement tiered industrial pollution prevention program for all industries discharging organic rich waste
- Improve asset management (implement computerized maintenance management system)

Summary of Ratepayer Costs and Cost Mitigation

- No bond driven rate impact until FY21 (July 2020)
- Maximum bond-driven rate impact for typical residential customer after 5 years =
 - \$64.32/year or \$5.36/month for WW and SW portion of bill
- Rate mitigation strategies save rate payers approximately 40%
 - Use of Vermont Clean Water State Revolving Fund (2% admin fee v.s 3.9% bond rate)
 - Leverage existing capital line in annual budget to pay some of debt service.
- Additional State grants may be available to further mitigate costs
- Evaluation of alternative rate structures and affordability programs by FY21

Summary of Bond Benefits

- Minimize permit violations and beach closures
- Upgrade disinfection systems in all three plants
- Major rehabilitation of all other critical clean water systems
- More green infrastructure and stormwater runoff reductions in combined sewer system and separate stormwater system

Additional Investments Will Be Needed

- Beyond 2022
 - Long term capital needs driven by outcome of Integrated Plan and other regulatory requirements
 - Phosphorus upgrades at WW Plants
 - Full build out combined sewer reduction projects (large and small scale)
 - Separate stormwater runoff management (structural and programmatic – i.e. street sweeping, leaf collection, downspout disconnection programs)
 - Additional investment in remaining high risk collection system and stormwater outfalls
- Drinking Water not included in this bond proposal
 - \$3 M remains of \$8.34 M bond authorization
 - Other needs
 - continued water pipe work
 - high tanks
 - ensure water plant, reservoir and pump house assets remain stable

Addressing Common Questions

- There HAS been clear progress in reducing our footprint on the Lake over time.
- We have > 1 million gallons of sewage processing capacity at our plants
 - However, reducing stormwater peak flows at the plant does help improve the treatment of stormwater and reduce phosphorus output
- Collection System CSOs (a legacy of our old city) are caused by intense rainstorms
- CSO volume are typically more than 90% stormwater
- 2018 unpermitted discharges and CSOs are not a key driver of Cyanobacteria

Resources

Visit the Clean Water Resiliency Plan web page:

<http://burlingtonvt.gov/DPW/cwrp>

Chapin Spencer, Director, cspencer@burlingtonvt.gov

Megan Moir, Assistant Director – WR, mmoir@burlingtonvt.gov

Rob Goulding, Public Information Mgr, rgoulding@burlingtonvt.gov

Main Wastewater Plant Tours
3rd Thursday of every Month
5-6:30 pm (through November)

